CLAIMS

We claim:

1. A method of processing a signal, comprising:

receiving the signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal;

5   determining an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions; and

determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions.

2. The method as recited in Claim 1, wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

5   comparing the average value determined for the respective one of the plurality of symbol positions with a symbol threshold value.

3. The method as recited in Claim 1, wherein determining an average value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

determining average values across the plurality of time slot intervals for

5   respective ones of the plurality of symbol positions;

wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

determining whether the respective ones of the plurality of symbol positions

10 contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions; and

wherein the method further comprises:

determining whether the received signal contains fixed symbols corresponding to a predefined symbol sequence.

4.   The method as recited in Claim 3, wherein determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions comprises:

5   comparing the average values determined for the respective ones of the plurality of symbol positions with a symbol threshold value.

5.   The method as recited in Claim 3, wherein determining whether the received signal contains fixed symbols corresponding to the predefined symbol sequence comprises:

comparing the average values determined for the fixed symbols with the

5   predefined symbol sequence to provide a correlation value; and

comparing the correlation value with a correlation threshold value.

6.   The method as recited in Claim 1, wherein the average value is determined using an algorithm selected from the group consisting of a sample average algorithm, a moving average algorithm, an exponentially weighted average algorithm, and an exponentially weighted moving average algorithm.

7.   The method as recited in Claim 1, further comprising:

associating each of the received symbols with a soft information value.

8.   The method as recited in Claim 7, wherein determining an average value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

determining an average soft information value across the plurality of time slot

5   intervals for the respective one of the plurality of symbol positions.

9.   The method as recited in Claim 8, wherein the average soft information value is determined using an algorithm selected from the group consisting of a sample

average algorithm, a moving average algorithm, an exponentially weighted average algorithm, and an exponentially weighted moving average algorithm.

10.   The method as recited in Claim 8, wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

5   determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average soft information value determined for the respective one of the plurality of symbol positions.

11.   The method as recited in Claim 10, wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average soft information value determined for the respective one of the plurality of symbol positions comprises:

5   comparing the average soft information value determined for the respective one of the plurality of symbol positions with a symbol threshold value.

12.   The method as recited in Claim 10, wherein determining the average soft information value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

determining average soft information values across the plurality of time slot
5   intervals for respective ones of the plurality of symbol positions;

wherein determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average soft information value determined for the respective one of the plurality of symbol positions comprises:

determining whether the respective ones of the plurality of symbol positions
10   contain fixed symbols based on the average soft information values determined for the respective ones of the plurality of symbol positions; and

wherein the method further comprises:

determining whether the received signal contains fixed symbols corresponding to a predefined symbol sequence.

13.   The method as recited in Claim 12, wherein determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average soft information values determined for the respective ones of the plurality of symbol positions comprises:

5   comparing the average soft information values determined for the respective ones of the plurality of symbol positions with a symbol threshold value.

14.   The method as recited in Claim 12, wherein determining whether the received signal contains fixed symbols corresponding to a predefined symbol sequence comprises:

          comparing the average soft information values determined for the fixed

5   symbols with the predefined symbol sequence to provide a correlation value; and

          comparing the correlation value with a correlation threshold value.

15.   The method as recited in Claim 1, wherein receiving the signal across the plurality of time slot intervals comprises:

          demodulating the signal to generate the sequence of symbols.

16.   The method as recited in Claim 1, wherein receiving the signal across the plurality of time slot intervals comprises:

          decoding the sequence of symbols to generate a sequence of decoded symbols associated with the received signal;

5   wherein determining the average value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

          determining an average decoded symbol value across the plurality of time slot intervals for the respective one of the plurality of symbol positions; and

          wherein determining whether the respective one of the plurality of symbol

10   positions contains the fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

          determining whether the respective one of the plurality of symbol positions contains the fixed symbol based on the average decoded symbol value determined for the respective one of the plurality of symbol positions.

17. A method of processing a signal, comprising:

receiving the signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal;

5   determining average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions; and

determining whether the received signal contains symbols corresponding to a predefined symbol sequence based on the average values determined for the respective ones of the plurality of symbol positions.

18. The method as recited in Claim 17, wherein determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average values determined for respective ones of the plurality of symbol positions comprises:

5   comparing the average values determined for the respective ones of the plurality of symbol positions with the predefined symbol sequence to provide a correlation value; and

comparing the correlation value with a correlation threshold value.

19. The method as recited in Claim 17, further comprising:

determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions; and

5   determining whether the received signal contains fixed symbols corresponding to the predefined symbol sequence.

20. The method as recited in Claim 19, wherein determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions comprises:

5   comparing the average values determined for the respective ones of the plurality of symbol positions with a symbol threshold value.

21.   The method as recited in Claim 19, wherein determining whether the received signal contains fixed symbols corresponding to the predefined symbol sequence comprises:

comparing the average values determined for the fixed symbols with the predefined symbol sequence to provide a correlation value; and

comparing the correlation value with a correlation threshold value.

22.   The method as recited in Claim 17, wherein the plurality of time slot intervals is N time slot intervals, wherein N is not greater than three.

23.   The method as recited in Claim 17, wherein receiving the signal across the plurality of time slot intervals comprises:

demodulating the signal to generate the sequence of symbols.

24.   The method as recited in Claim 17, wherein receiving the signal across the plurality of time slot intervals comprises:

decoding the sequence of symbols to generate a sequence of decoded symbols associated with the received signal;

wherein determining the average values across the plurality of time slot intervals for the respective ones of the plurality of symbol positions comprises:

determining average decoded symbol values across the plurality of time slot intervals for the respective ones of the plurality of symbol positions; and

wherein determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average values determined for the respective ones of the plurality of symbol positions comprises:

determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average decoded symbol values determined for the respective ones of the plurality of symbol positions.

25.   A method of processing a received signal, which comprises a desired signal and an interference signal, across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions

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associated therewith to provide a sequence of symbols associated with the received

5   signal, the method comprising:

determining an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions; and

determining whether the received signal contains a symbol corresponding to a symbol associated with the interference signal based on the average value determined

10   for the respective one of the plurality of symbol positions.

26.   The method as recited in Claim 25, wherein determining an average value across the plurality of time slot intervals for the respective one of the plurality of symbol positions comprises:

determining average values across the plurality of time slot intervals for

5   respective ones of the plurality of symbol positions; and

wherein determining whether the received signal contains a symbol corresponding to the symbol associated with the interference signal based on the average value determined for the respective one of the plurality of symbol positions comprises:

10   determining whether the received signal contains symbols corresponding to a symbol sequence associated with the interference signal based on the average values determined for respective ones of the plurality of symbol positions.

27.   The method as recited in Claim 26, further comprising:

processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

28.   The method as recited in Claim 27, wherein processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal comprises:

5   determining whether to demodulate the received signal using joint demodulation based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

29.   The method as recited in Claim 28, wherein a ratio of a power of the desired signal to a power of the interference signal is in a range of about 10 dB to about 25 dB.

30.   The method as recited in Claim 28, wherein the received signal further comprises a noise signal, and wherein a ratio of a power of the desired signal to a power of the noise signal is in a range of about 23 dB to about 33 dB.

31.   The method as recited in Claim 27, wherein processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal comprises:

5   estimating a channel associated with the interference signal based on the symbol sequence associated with the interference signal if the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

32.   The method as recited in Claim 31, wherein processing the desired signal based on the determination of whether the received signal contains symbols corresponding to the symbol sequence associated with the interference signal comprises:

5   estimating a timing delay between the desired signal and the interference signal based on the symbol sequence associated with the interference signal if the received signal contains symbols corresponding to the symbol sequence associated with the interference signal.

33.   The method as recited in Claim 26, further comprising:
        determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions; and

5   determining whether the received signal contains fixed symbols corresponding to the symbol sequence associated with the interference signal.

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34   The method as recited in Claim 33, wherein determining whether the respective ones of the plurality of symbol positions contain fixed symbols based on the average values determined for the respective ones of the plurality of symbol positions comprises:

5   comparing the average values determined for the respective ones of the plurality of symbol positions with a symbol threshold value.

35.   The method as recited in Claim 33, wherein determining whether the received signal contains fixed symbols corresponding to the symbol sequence associated with the interference signal comprises:

        comparing the average values determined for the fixed symbols with the
5   symbol sequence associated with the interference signal to provide a correlation value; and

        comparing the correlation value with a correlation threshold value.

36.   The method as recited in Claim 26, wherein the symbol sequence associated with the interference signal is a predefined symbol sequence.

37.   A communication apparatus, comprising:

        a fixed information detection unit that is responsive to a received sequence of symbols associated with a signal received across a plurality of time slot intervals, the fixed information detection unit comprising:

5   an averaging unit that generates an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions responsive to the received signal; and

        a fixed symbol estimation unit that generates a fixed symbol control signal that identifies whether the respective one of the plurality of symbol positions contains a
10   fixed symbol responsive to the average value generated for the respective one of the plurality of symbol positions.

38.   The communication apparatus as recited in Claim 37, wherein the averaging unit generates average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions responsive to the received signal,

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and wherein the fixed symbol estimation unit generates the fixed symbol control

5   signal that identifies whether respective ones of the plurality of symbol positions

contain fixed symbols responsive to the average values generated for the respective

ones of the plurality of symbol positions, the communication apparatus further

comprising:

a known information detection unit that generates an output signal indicative

10   of whether the received signal contains fixed symbols corresponding to a predefined

symbol sequence responsive to the fixed symbol control signal and the average values

generated for the identified respective ones of the plurality of symbol positions

39.   The communication apparatus as recited in Claim 38, further

comprising:

a demodulation unit that generates the received sequence of symbols

responsive to the received signal and the output signal from the known information

5   detection unit.

40.   The communication apparatus as recited in Claim 39, wherein the

demodulation unit is a joint demodulation unit, the received signal comprises a

desired signal and an interfering signal, and the received sequence of symbols are

associated with the interfering signal.

41.   The communication apparatus as recited in Claim 40, wherein the joint

demodulation unit is an adaptive joint demodulation unit.

42.   The communication apparatus as recited in Claim 41, further

comprising a control unit that generates a mode control signal responsive to the output

signal from the known information detection unit, the adaptive joint demodulation

unit being responsive to the mode control signal to place the adaptive joint

5   demodulation unit into one of a joint demodulation mode and a single user

demodulation mode.

43.   The communication apparatus as recited in Claim 37, wherein the

received signal is a communication signal received over a wireless communication

network and the communication apparatus is one of a mobile terminal and a base transceiver station.

44.   The communication apparatus as recited in Claim 37, further comprising:

a demodulation unit that generates the sequence of symbols responsive to the received signal.

45.   The communication apparatus as recited in Claim 37, further comprising:

a decoding unit that generates a sequence of decoded symbols associated with the received signal responsive to the sequence of symbols;

5   wherein the fixed information detection unit is responsive to the sequence of decoded symbols;

wherein the averaging unit generates an average decoded symbol value across the plurality of time slot intervals for the respective one of the plurality of symbol positions responsive to the sequence of decoded symbols; and

10   wherein the fixed symbol estimation unit generates the fixed symbol control signal that identifies whether the respective one of the plurality of symbol positions contains the fixed symbol responsive to the average decoded symbol value generated for the respective one of the plurality of symbol positions.

46.   A communication apparatus, comprising:

a fixed information detection unit that is responsive to a received sequence of symbols associated with a signal received across a plurality of time slot intervals, the fixed information detection unit comprising:

5   an averaging unit that generates average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions responsive to the received signal; and

a known information detection unit that generates an output signal indicative of whether the received signal contains fixed symbols corresponding to a predefined

10   symbol sequence responsive to the average values generated for the respective ones of the plurality of symbol positions.

47.   The communication apparatus as recited in Claim 46, further comprising:

a demodulation unit that generates the received sequence of symbols responsive to the received signal and the output signal from the known information detection unit.

48.   The communication apparatus as recited in Claim 47, wherein the demodulation unit is a joint demodulation unit, the received signal comprises a desired signal and an interfering signal, and the received sequence of symbols are associated with the interfering signal.

49.   The communication apparatus as recited in Claim 48, wherein the joint demodulation unit is an adaptive joint demodulation unit.

50.   The communication apparatus as recited in Claim 49, further comprising a control unit that generates a mode control signal responsive to the output signal from the known information detection unit, the adaptive joint demodulation unit being responsive to the mode control signal to place the adaptive joint demodulation unit into one of a joint demodulation mode and a single user demodulation mode.

51.   The communication apparatus as recited in Claim 46, wherein the received signal is a communication signal received over a wireless communication network and the communication apparatus is one of a mobile terminal and a base transceiver station.

52.   The communication apparatus as recited in Claim 46, further comprising:

a demodulation unit that generates the sequence of symbols responsive to the received signal.

53.   The communication apparatus as recited in Claim 46, further comprising:

a decoding unit that generates a sequence of decoded symbols associated with the received signal responsive to the sequence of symbols;

5   wherein the fixed information detection unit is responsive to the sequence of decoded symbols;

wherein the averaging unit generates average decoded symbol values across the plurality of time slot intervals for the respective ones of the plurality of symbol positions responsive to the sequence of decoded symbols; and

10   wherein the known information detection unit generates the output signal indicative of whether the received signal contains the fixed symbols corresponding to the predefined symbol sequence responsive to the average decoded symbol values generated for the respective ones of the plurality of symbol positions.

54.   A communication apparatus, comprising:

means for receiving a signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal in respective ones of the plurality of symbol positions;

5   signal in respective ones of the plurality of symbol positions;

means for determining an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions; and

means for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the

10   respective one of the plurality of symbol positions.

55.   The communication apparatus as recited in Claim 54, wherein the means for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

5   means for comparing the average value determined for the respective one of the plurality of symbol positions with a symbol threshold value.

56.   A communication apparatus, comprising:

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means for receiving a signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received

5   signal in respective ones of the plurality of symbol positions;

means for determining average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions; and

means for determining whether the received signal contains symbols corresponding to a predefined symbol sequence based on the average values

10   determined for the respective ones of the plurality of symbol positions.

57.   The communication apparatus as recited in Claim 56, wherein the means for determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average values determined for respective ones of the plurality of symbol positions comprises:

5   means for comparing the average values determined for the respective ones of the plurality of symbol positions with the predefined symbol sequence to provide a correlation value; and

means for comparing the correlation value with a correlation threshold value.

58.   A computer program product for processing a received signal, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

5   computer readable program code for receiving the signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal in respective ones of the plurality of symbol positions;

10   computer readable program code for determining an average value across the plurality of time slot intervals for a respective one of the plurality of symbol positions; and

computer readable program code for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value

15   determined for the respective one of the plurality of symbol positions.

59.   The computer program product as recited in Claim 58, wherein the computer readable program code for determining whether the respective one of the plurality of symbol positions contains a fixed symbol based on the average value determined for the respective one of the plurality of symbol positions comprises:

5   computer readable program code for comparing the average value determined for the respective one of the plurality of symbol positions with a symbol threshold value.

60.   A computer program product for processing a received signal, comprising:

a computer readable storage medium having computer readable program code embodied therein, the computer readable program code comprising:

5   computer readable program code for receiving the signal across a plurality of time slot intervals, respective ones of the plurality of time slot intervals having a plurality of symbol positions associated therewith to provide a sequence of symbols associated with the received signal in respective ones of the plurality of symbol positions;

10   computer readable program code for determining average values across the plurality of time slot intervals for respective ones of the plurality of symbol positions; and

computer readable program code for determining whether the received signal contains symbols corresponding to a predefined symbol sequence based on the

15   average values determined for the respective ones of the plurality of symbol positions.

61.   The computer program product as recited in Claim 60, wherein the computer readable program code for determining whether the received signal contains symbols corresponding to the predefined symbol sequence based on the average values determined for respective ones of the plurality of symbol positions comprises:

5   computer readable program code for comparing the average values determined for the respective ones of the plurality of symbol positions with the predefined symbol sequence to provide a correlation value; and

computer readable program code for comparing the correlation value with a correlation threshold value.